

Measures of Real Estate Values from Land Registration and Valuation Systems in Emerging Economies: The Case of Ghana

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SUMMARY

Real estate markets in emerging economies have been studied primarily from the perspectives of land rights, and the linkages between real estate cycles and financial crises in Asia. The evolution of real estate rental markets and investment markets in emerging economies (beyond the foundations of legal title and land registration), the role they play in the process of broader economic development and their linkages to the financial system outside of crisis periods, are issues which have received surprisingly little attention. That lack of research is in part due to the absence of reliable indicators of trends in rental values, capital values and yields.

This paper, which forms part of a wider investigation of Ghanaian real estate markets, being undertaken as a doctoral thesis at Cass Business School, investigates methods to create such measures from the state land registration and valuation systems. Hedonic model techniques have been applied using transaction-based data from 1998 to 2005 from the Ghana Land Valuation Board to empirically decompose actual sale (transaction) price; and also to construct investment real estate index on a pilot basis for Ghana.

Our provisional conclusions are that real estate heterogeneous characteristics such as property size, quality of landscaping, plot size and location are significant variables that influence real estate prices in Ghana. A hedonic model incorporating these variables achieves a high level of explanation of transactions prices in residential real estate investments, and produces a provisional estimate of changes in dollar prices of this stock over the last seven years. Further work will extend the time period and depth of the modeling, and examine the credibility of estimated price indices (in both dollars and local currencies) against other indicators of market trends.

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1. INTRODUCTION

Formal commercial real estate markets – modern residential, retail and office space leased on well-defined contracts, and demanding large amounts of development capital – are in an early state of development in many African economies. These nascent investment markets have received little attention from researchers and policy-makers, in contrast to the large volume of work on the foundation stages of real estate markets such as land rights issues and land registration. The role of formal real estate investment markets in the process of economic development therefore remains poorly understood. The lack of understanding is, in part, a direct result of the absence of reliable information on real estate values, yields and total returns. Adair et al (2004), commenting on the real estate investment markets in transitional East European economies, point out that “data transparency is a key characteristic of a mature market, and markets that are able to demonstrate that they possess such data have a competitive advantage and are more likely to attract private sector investment funds”. Indicators of real estate transparency produced by international real estate advisors (for example Jones Lang LaSalle, 2004) also emphasise the importance of market data and benchmarks of investment return in creating efficient capital markets.

The work in this paper forms part of a wider investigation of the operation of commercial real estate markets in emerging economies, centered upon a case study of Ghana. The paper explores the feasibility of constructing an index of investment values based on valuation and transactions records held by the Ghana Land Valuation Board. It reports a pilot exercise covering the period 1998 to 2005, which uses hedonic modeling methods to extract estimates of market movement from heterogeneous transactions evidence. Our intention is to extend the length of the time series and depth of data to produce the first Ghana “Index” of real estate values and returns. Given the existence of similar land registration systems in other developing countries, the approach may be more widely applicable.

Following this introduction, the paper is organised in four sections. We first give a short profile of the Ghanaian economy, and previous research on its real estate markets (Section 2). Then Section 3 defines data and methodology, Section 4 analyses results, and Section 5 concludes.

2. GHANA AND ITS REAL ESTATE MARKETS

2.1 National Overview

Ghana is a West African country, with a population of 22 million, bounded by the Gulf of Guinea on the south, Cote d'Ivoire to the west, Burkina Faso to the north, and Togo to the East. Its borders were established under colonial rule in 1821. Ghana was the first Sub-Saharan colony to gain independence in 1957. From 1972 to 1992, the country was politically and economically unstable, under a long series of coups and frequent suspensions of democratic elections. Constitutional reforms in 1992 have been followed by a period of stable multi-party democratic governance.

Over the last decade, the economy has seen fairly steady progress (Exhibit 1). Real GDP growth has been sustained close to its average rate of 4.7% per year, rising to over 5% in each of the last three years. Inflation, though still running at 15% in 2005, has been less variable and on a downward trend in recent years. GDP per capita has been rising steadily since the early 1990s, reaching an annualised rate of 2.1% over the last ten years.

On the World Bank's Development Indicators (World Bank 2005), Ghana's gross national income per capita (purchasing power parity) in 2003 stood at US\$ 2,190 – ranking 155th out of 208 countries, only marginally above the average for World Bank “low income” countries, but 25% above the average for Sub-Saharan Africa.

2.2 Land Registration and Land Policy

Land registration systems – widely seen as key foundation stage in economic development (see for example Deininger, 2003) - have a long history in Ghana. According to Agbosu (1990) and Woodman (1988), land registration was first introduced in 1883 with the Land Registration Ordinance, followed by Land Registry Ordinance in 1895. Though these form the distant antecedents to the current systems of land registration, they were largely instruments created by the colonial administration to protect the land rights of minority white merchants who at the time were the dominant purchasers in the land market. The land market was then rapidly developing in the southern parts of the country within a plural tenurial arrangement - common and customary law (Woodman, 1988).

A post-colonial Land Registry Act, (Act 122) was passed in 1962. This Act had a nationwide coverage but like its predecessors, it sought to record formal transactions deeds and not to register proprietary interest including customary claims. In 1986, an extension of the system was introduced by the Land Title Registration Law, PNDCL 152. For the first time, this law provides for systematic registration of all interests in land – under both common law and customary ownerships. To date, however, that process of full registration has been limited to cities of Accra, Tema and Kumasi¹ - by far the most developed real estate markets in Ghana.

¹ Section 5 of PNDCL 152 and the Legislative Instruments made there under.

Though title registration is compulsory, not all transactions are fully registered in the system. The transition between Act 122 and PNDCL 152 has not been managed properly due to institutional bottlenecks such as lack of cooperation between the Land Title Registry and Lands Commission; and the inability of Survey Department to produce required sub-divided parcel plans.

The Government's National Land Policy (1999) set out an ambitious long-term registration strategy, to be implemented over 15-25 years. The Policy aims to "stimulate economic development, reduce poverty and promote social stability by improving security of land tenure, simplifying the process for accessing land and making it fair, transparent and efficient, developing the land market and fostering prudent land management" (Ministry of Lands and Forestry, 1999). Currently, the Ministry of Lands, Forestry and Mines is embarking on a Land Administration Project (LAP) as the main tool for implementing the National Land Policy. The project's goals are "to reduce poverty and enhance social growth through improving security of tenure, accelerating access to land by the populace and fostering efficient land management by developing efficient systems of land titling and administration based on clear coherent and consistent policies and laws supported by appropriate institutional structures" (World Bank 2003).

Despite the far-reaching objectives of the LAP, information on the Ghanaian real estate market is still fragmented and difficult to access. Evidence on transactions in the formal sector is collected by six different agencies: the Land Valuation Board, Lands Commission, Survey Department, Land Title Registry, Office of the Administrator of Stool Lands and the Town and Country Planning Department. Each of these operates as a separate corporate body with little coordination. The Land Valuation Board was established in 1986 with the goals of consolidating information into a national database, and disseminating information on real estate markets to investors and the general public (PNDC Law 42). Unfortunately, the Board has made little progress towards these goals.

The emphasis of policy initiatives in Ghana, therefore, remains on issues of land administration; particularly land titling, continued inefficiencies in tenurial arrangement, disputes over land ownership and the release of unused public lands. It appears that discussion is still dominated by the failings of broad land policy, with little attention to the functioning of formal rental and investment markets which have already overcome problems of ownership and clear title.

2.3 Previous Research on Ghanaian Real Estate Markets

Quantitative studies into real estate prices in Ghana are extremely limited. In the only instance of such study of formal markets, Asabre (1981a) applies hedonic analysis to explain the sale price of vacant lands in Accra. Data on 211 transactions of vacant urban sites from 1974 to 1978 were obtained from Bank of Housing and Construction (now liquidated) and three unnamed major real estate brokers in Accra. The records were verified with the Lands

Department². The study establishes that variables such as location, zoning, land tenure, ethnic clustering, time-of-sale, lot size, and site services all contributed to the determination of land values. It also found that stool lands are sold at discount prices. However, the study did not extend to any estimates of changes in land values over time.

More recently, Antwi (2002) uses a hedonic approach to investigate the relationship between the price of building plots and variables including date of transaction, state of development of the land, neighbourhood quality, whether the land was obtained from government or customary land owners, source of finance, the extent of market search undertaken before purchase, sources of market information, perception of real estate rights purchased, and the cost of registration in the informal sector. The study employs transaction-based primary data from a sampled survey of 305 market participants such as land purchasers, customary landowners and real estate consulting firms. As a determinant of price, he finds real estate rights are not a significant factor in price determination, suggesting that all purchasers perceive they are effectively buying perpetual real estate rights. Market information is also found to be informally acquired by all land purchasers and therefore not an important variable in price determination. As in Asabre (1981a), no time series estimates were produced.

The only previous work which seeks to generate measures of change in real estate values is a study dealing primarily with the informal sector by Antwi and Omirin (2006). Primary data on rental values and premiums or “goodwill” were obtained from a survey of tenants in Accra, Ghana, and from tenants, owners and land agents in Lagos, Nigeria. Estimates of rental yields, rate of return and capital return were constructed from valuation-based data for 1999 to 2003. Using transaction-based data from a number of real estate developers and market intermediaries, the authors analyse sale price changes as the basis for comparing the informal with the formal real estate market in Accra. Between 1999 and 2003, the formal residential market recorded real annual growth of up to 10%, with an overall mean of 7.18%. Average rental yields in the formal sector, at 5.95%, were found to be comparable with those in the informal sector.

2.4 The Formal Real Estate Markets

Our focus is on that segment of the market which falls fully in the formal sector - commercial real estate in this study defined as income producing real estate assets ranging across residential, retail and office units. (Industrial and warehousing real estate assets are predominantly owner-occupied and thus excluded.)

Much of the development which has occurred in the formal sector has been fostered by Government policy, providing an enabling environment for public and private sector participation. The Ghana Real Estate Developers Association (GREDA), for example, draws together representatives of Government departments, property professional bodies, brokers and major developers to co-ordinate public policy and the private sector. The developer

² Now split into Land Valuation Board, Lands Commission and Office of the Administrator of Stool Lands.

members of GREDA are the major suppliers of new rented residential real estate in Ghana and have contributed significantly towards the development of residential markets in Accra, Tema, Kumasi and Takoradi. Their new gated communities in Accra are emerging as preferred residential locations, with strong demand from expatriate workers in Ghana as well as Ghanaians in the high-income bracket. Other prominent real estate developers are state agencies such as the Tema Development Company, State Housing Company, and the Social Security and National Insurance Trust (SSNIT).

The city's long-established top-quality residential areas such as Airport Residential, Cantonments, Labone, Ridge and Roman Ridge, were originally developed exclusively for housing. In recent years they have attracted an influx of international businesses, and are becoming mixed-used zones. In these established high-quality areas most current activity is redevelopment, through which "colonial" bungalows on large plots are being sub-divided into higher density houses and apartments.

Newer residential locations, for both owner-occupation and rental real estate, include East Legon Extension, East Airport Residential, Ashaley Botwe and Dome in Accra, and Communities 18, 19, 20, and 21 in Tema. Housing developments in these neighborhoods are newly constructed with modern designs, but the quality of the environment is poor compared to the up-market locations. They lack drains, tarred roads, and a reliable supply of utility services.

Formal real estate markets in leased retail and office properties are much less developed than in residential, and are largely privately owned. In the retail sector, there has been upsurge in modern shopping chains (A-Life Supermarkets, MaxMart, Koala and Swanzy Arcade) sited in residential areas or at transit points for commuters, in competition with the traditional shopping areas in Central Business Districts. The new retail stock, however, remains predominantly owner-occupied, while traditional locations operate in the informal real estate markets. For these reasons, no retail real properties are included in our analysis.

The modern office stock built as investments – schemes such as Mobil House, Trinity House, Pegasus House, Opeibea House, Millennium Tower and Fidelity House – are owned by corporate bodies or private individuals. Recent development has gravitated towards the "Independence Avenue Corridor" running from Ridge to the airport. Major schemes include high-rise complexes (up to 15 floors) developed by SSNIT along the Independence Avenue at Ridge, the office complex of Latter Days Church and several projects in Airport City. Though there is now a substantial, and rapidly growing, leased office stock, transactions in this sector have been rare, so no very few observations are captured in our analysis.

Both residential and non-residential properties in the formal sector are let on varying lease terms. Lease lengths run from five years upward, typically with provisions for rent reviews to market values every three to five years. Rents are usually quoted in US Dollars, but payable in local currency (Cedi) because financial regulations frown on payment in other currencies. Dollar denominated rents offer landlords – many of whom are foreign-based Ghanaians -

some protection against currency fluctuations and local inflation. A convention of paying rents for the first year in advance also offers some protection against inflation.

3 DATA AND METHODOLOGY

3.1 Data

The study uses data on transactions in rented properties in Accra and Tema for the period 1998 to 2005, with a total number of 368 observations. The main source of data is the Land Valuation Board, Accra. The Board keeps a database – hardcopies in the form of files and ledgers – consisting of extracts from all transactions submitted for Stamp Duty assessment, plus a compilation of sale and letting transactions by members of GREDA. These files contain fields covering a physical description of each property, location, sale price, rent payable, plot size, the type of interest transacted, parties, date-of-transaction, terms and conditions, and floor areas. All details are evidenced in writing in accordance with the Conveyancing Decree, 1973 (NRCD 175). Data on rents and sale prices are all quoted in US dollars.

Accra is Ghana's largest city, with a population of 1,853,540 (Ghana Statistical Services 2005 estimates). Tema with a population of 565,804 is the 6th largest city, the country's largest port and a major industrial centre. Together they form the dominant commercial and industrial conurbation in Ghana.

3.2 Methodology

Hedonic models have been extensively used in the analysis of residential real estate markets³. However, the bulk of this literature has examined developed economies. One of the few exceptions is Wen et al (2005), which analyses the housing market in Hangzhou City, China. Of greater relevance to the current study are Asabre (1981a) and Antwi (2002) supra who apply hedonic techniques to the Ghanaian market. In this paper, we use the hedonic regression to empirically 'calibrate' actual sale transaction price in Ghana. That is:

$$\ln P(x_j) = \beta_0 + \sum_{i=1}^n \ln \beta_i x_{ij} + \varepsilon_i \quad [j=1\sim 368]; [i=1\sim 8] \quad (1)$$

Where P is the sale price of the real estate at time j, β_i are the coefficients, x_{ij} are the independent variables (real estate characteristics), and ε_i are the random errors.

We use transaction based data to model the relationship between heterogeneous real estate characteristics and the price of individual real estate assets. The characteristics used are: number of storeys, number of bedrooms, garage/outhouse, detached, semi-detached, apartment, security of tenure, landscape, gross internal floor areas, plot size, and unexpired

³ For a recent review of the hedonic literature in housing economics see Sirmans et al. (2005).

lease term. Dummy variables are employed to represent different locations and other qualitative characteristics. Definitions of these variables are given in Exhibit 2.

4 ANALYSIS OF RESULTS

4.1 Real estate location, classification and level of values

Table 1 below shows the five locations and composition of the 368 transactions covered in this paper. Locations⁴ have been classified by the authors, based on their neighbourhood characteristics.

Table 1: Summary of sale prices by location: 1998 to 2005

Location	No. of observations	Minimum Sale price	Maximum Sale price	Mean of price	Median of price
1	80	140,000	855,000	309,417	295,000
2	141	11,500	660,000	146,391	103,000
3	74	11,500	180,000	30,070	49,075
4	9	11,850	62,400	26,355	25,181
5	64	17,182	175,000	60,039	49,518
Total	368				

Locations 1-4 represent a range of residential areas in Accra. Location 1 covers fully developed first-class residential areas, where government owns the freehold interest in land. It yields 80 residential transactions, representing 22% of the total sample. Location 2 consists of two gated communities developed by private firms - Regimanuel Gray and Trasaco. These are newer high-income neighbourhoods, where freehold interests are held by customary owners – stools⁵ and families. About 38.2% of the sample size is obtained from this location. With 74 observations - representing 20% of the sample size, Location 3 covers three neighbourhoods of recently developed middle-income housing. The freehold interests in these areas are also held by customary owners. Location 4 covers two neighbourhoods where large schemes, predominantly blocks of flats, built by the Social Security and National Insurance Trust (SSNIT) - a state agency. It represents 2.4% of the sample size.

⁴ Location 1 consists of Airport Residential, Labone, Cantonments, Ridge and Roman Ridge; Location 2 consists of East Airport and East Legon Extension; Location 3 consists of Dome, Pokuase and Ashaley Botwe –NTHC; Location 4 consists of Adenta and Dansoman, all in Accra; and Location 5 consists of Communities 3, 4, 14, 18, 19, 20 and 22 in Tema.

⁵ Stools refer to the larger corporate indigenous land owning groups or communities comprising people of common ancestry and headed by a chief or king in Ghana.

Location 5 covers 7 communities in Tema; representing 17.4% of the sample size. These are residential areas developed by the Tema Development Company, a state organisation established to plan and develop Tema Township to support the harbour and industry. Freehold interests are held by the state.

The differing characteristics of the stock and overall quality of these areas are reflected in a wide variation in transaction prices (Table 1). Location 1 commands premium prices, with an average more than double any of the other areas. Location 2 shows a wider spread of stock, but the upper end of the range shows a large overlap with the top quality area. Locations 3 to 5, middle-income areas, are more broadly comparable in the ranges and averages of prices.

4.2 Significance of Real Estate Attributes

In total 21 independent variables are used in the hedonic model, the results of which are summarised in Table 2 below. Sale prices, number of bedrooms, gross internal area, and plot size were modeled in natural logarithms, and all other variables in the form of dummies. Overall the model achieves a high degree of explanation (R-squared 0.94). The location coefficients are, with the exception of Location 3, highly significant, and point to a price differentiation between Accra and Tema, and premium prices for Locations 1 and 2 within Accra, after all other factors have been taken into account.

Results for the set of property attributes are mixed. The physical attributes of individual units – number of storeys, number of bedrooms, and presence of a garage – are all statistically insignificant. It appears that all price differentiation due to physical attributes is being picked up by the broader indicators of size (Gross Internal Area and plot size), and by the Detached / Apartment variables, all of which show the expected signs and strong statistical significance. The quality of landscaping is also positively signed and strongly significant, in line with findings from Bourassa et al (2005).

The State Freehold and Unexpired Term variables reflect different aspects of the security of leasehold interests in land. State Freehold is a dummy variable taking the value of 1 for freehold interests held by the Government, and zero for other freeholders, primarily customary owners. The low value of the coefficient and extremely weak statistical significance indicate that leasehold interests from both types of owner are perceived as equally well-secured, which may be surprising given the frequency of land disputes in the customary sector. The findings are however consistent with Antwi (2002) who found similar results with respect to urban land prices.

Our results also suggest no association between prices and the remaining term of ground leases, where a reduction in value with shorter terms may have been expected. This may be taken as showing that buyers are confident that leasehold interests would be renewed on expiry. The vast majority of properties in the sample, however, had long periods remaining on ground leases, and a larger sample of varying terms would be needed to confirm that conclusion.

Table 2: Hedonic Regression results

Variables	Coefficient	T-Statistic
Constant	5.311469	9.231008***
Year Dummies		
1999	-0.033311	-0.318673
2000	-0.073093	-0.719491
2001	-0.002334	-0.026123
2002	-0.112059	-1.181163
2003	0.055607	0.599693
2004	0.258342	2.734128***
2005	0.420331	4.674148***
Location Dummies		
Location 1	0.329809	3.091503***
Location 2	0.105529	2.750296***
Location 3	0.005650	0.045948
Location 5	-0.270159	-4.128067***
Property Description		
Number of Storeys	0.023028	0.571299
Number of Bedrooms	-0.030421	-0.568213
Garage/Outhouse	0.036006	1.147888
Detached	0.227064	6.127267***
Apartment	-0.531540	-3.433876***
Good Quality Landscaping	0.180230	4.296475***
Gross Internal Area	0.945188	20.35353***
Plot Size	0.170608	3.634157***
Security of Tenure		
State Freehold	0.038275	0.600806
Unexpired Term	-0.117066	-1.048716
R-Squared	0.943231	

Notes: * indicates significance at a 10% level, ** at a 5% level and *** at a 1% level.

The time dummies are used to create a preliminary Price Index for residential investments in Accra and Tema. The exponential of the respective coefficient is multiplied by an index base figure of 100 for 1998, the missing year dummy. The results, displayed in Figure 1 below, show small price movements through the years 1998-2002 followed by strong growth in the last three years.

It should however be emphasised that the results are in US Dollar terms. As noted earlier, both rental and transactions prices are commonly determined in Dollars rather than Cedis as the majority of investors in the residential investment market are domiciled overseas. It is intended that future work on the Ghanaian market explore the issue of dollar pricing in more detail and highlight the interlinkages between prices in local terms and movements in the Cedi-US Dollar exchange rate.

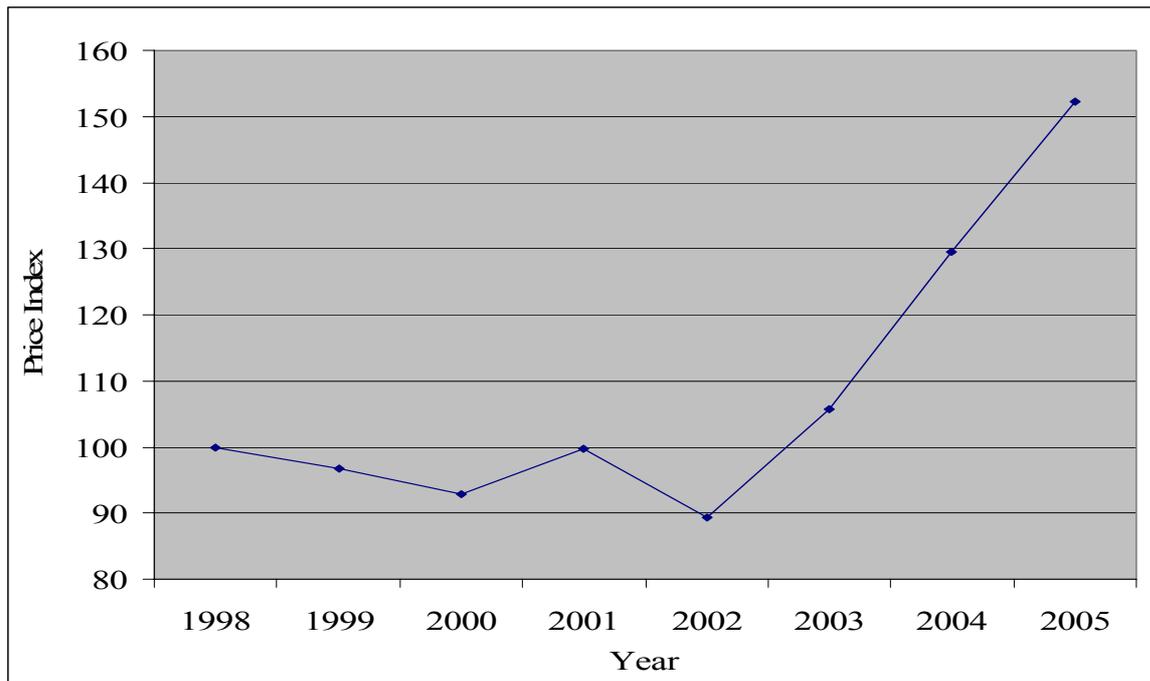


Figure 1: Accra-Tema Residential Investments Price Index: 1998-2005 US\$ Denominated

5. CONCLUSION

This paper has provided an initial examination of the residential investment market in the “twin cities” of Accra and Tema in Ghana. Through the construction of a hedonic model the price characteristics of the market, in relation to property specific characteristics and market trends have been explored. The examination of an emerging economy and emerging property market, and the use of data from a basic land registration system, mean that the results obtained are of particular interest. The results demonstrate that a hedonic model constructed using the variables available in the Ghana Land Valuation Board achieves a high level of explanation of variation in residential transactions prices. Having piloted the method on an initial sample of records, later work will add more observations and extend the time period covered by the analysis.

The characteristics of the Ghanaian market and in particularly the dominant role of overseas based investors in the market and the subsequent pricing of investment property in US Dollars is an issue that the authors intend to examine in further depth. Given the volatility in the US Dollar-Cedi exchange rate, in part due to the high inflation rates during some of the sample period, the impact of US Dollar pricing is of interest in the context of domestic investors. As both the Ghanaian economy generally and specifically the real estate market develops one would expect increased investment from domestic based investors.

REFERENCES

- Adair, A. Allen, S. Berry, J. and McGreal, S, (2004). *The development of real estate markets in Central and Eastern Europe - issues of data*, RICS Foundation 2004
- Antwi, A. (2002). A study of informal urban land transactions in Accra. *Our Common Heritage. RICS Foundation*.
- Antwi, A. and Omirin, M. 2006. The investment performance of informal properties in Accra, Ghana and Lagos, Nigeria. RICS Research Paper Series, Vol. 6, No. 4.
- Asabre, P. K. (1981a). The determinants of land values in an African City: the case of Accra, Ghana. *Land Economics*, Vol. 57, No. 3.
- Bourassa, S. C. *et al.* (2005). The price of aesthetic externalities. *Journal of real estate literature*, Vol. 13, No. 2.
- Conveyancing Decree, 1973 (NRCD 175)
- Deininger, K. (2003) *Land Policies for Growth and Poverty Reduction*, Oxford University Press and the World Bank, 2003
- De Soto, H. 2000. *The Mystery of Capital: Why capitalism triumphs in the West and fails everywhere else*. Bantam Press, U.K.
- Jones Lang LaSalle, 2004. *Global real estate transparency index*.
- Land Registry Act, 1962 (Act 122)
- Land Title Registration Law, 1986 (PNDCL 152)
- Land Registration Ordinance 1883
- Land Registry Ordinance 1895
- Leishman, C. (2003). *Real estate market research and analysis*. Palgrave Macmillan
- Ministry of Lands and Forestry (1999). *National Land Policy*.
- Provisional National Defence Council Law, 1982 (PNDCL 42)
- Sirmans, G. S. *et al.* (2005). The composition of hedonic pricing models. *Journal of real estate literature*, Vol. 13, No. 1
- Wen, H. *et al.* (2005). Hedonic price analysis of urban housing: an empirical research on Hangzhou, China. *Journal of Zhejiang University SCIENCE 6A (8)*.
- World Bank (2003). *Project Appraisal Document for the Land Administration Project in Ghana*.
- World Bank (2006). *World Development Indicators database*.

BIOGRAPHICAL NOTES

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Exhibit 1
Gross Domestic Product and Inflation Rates: 1996 to 2005

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Real GDP Growth (%)	4.6	4.2	4.7	4.4	3.7	4.2	4.5	5.2	5.8	5.8
US Dollar-Cedi Exchange Rate	1,637.24	2,050.28	2,314.15	2,647.32	5,455.90	7,170.80	7,932.31	8,697.49	9,004.63	9,065.76
Inflation (%)	44.4	24.8	19.2	12.4	25.2	32.9	14.8	26.7	12.6	15.1

Source: IMF World Economic Outlook 2006.

Exhibit 2
Definition of Variables

Variable	Definition
Dependent Variable	
<i>Sales Price</i>	<i>Natural logarithm of sale price of unfurnished real estate.</i>
Independent Variables	
<i>Location</i>	<i>Dummy variable for quality of neighbourhood in terms of accessibility and availability of utilities and amenities.</i>
<i>Storey</i>	<i>Dummy variable for whether real estate has Single, two, three or more storey.</i>
<i>Bedrooms</i>	<i>Natural logarithm of number of bedroom(s)</i>
<i>Garage</i>	<i>Dummy variable indicating whether the real estate has a garage.</i>
<i>Outhouse</i>	<i>Dummy variable indicating whether the real estate has an outhouse.</i>
<i>Garage/outhouse</i>	<i>Dummy variable indicating whether the real estate has both garage and outhouse.</i>
<i>Detached</i>	<i>Dummy variable for detached real estate.</i>
<i>Semi-detached</i>	<i>Dummy variable for semi-detached real estate.</i>
<i>Flat</i>	<i>Dummy variable for a flat.</i>
<i>State Freehold</i>	<i>Dummy variable indicating whether the paramount interest in the subject land is held by the government or a stool (customary holder).</i>
<i>Landscaping</i>	<i>Dummy variable for quality of landscaping relative to other real estate assets in the vicinity.</i>
<i>Gross internal floor area</i>	<i>Natural logarithm of gross internal floor area in square metres</i>
<i>Plot size</i>	<i>Natural logarithm of plot size in square metres.</i>
<i>Tenure (Unexpired lease term)</i>	<i>Natural logarithm of unexpired lease term</i>